(3.) (9 points) A large tank is being filled with water. The flow rate of water into the tank, in units of gallons per hour, is given by

\[ r(t) = 70 + 10 \cos \left( \frac{\pi t}{2} \right), \]

where \( t \) is measured in hours.

(a) Sketch an accurate graph of \( r(t) \) on the following axes.

(b) Use a definite integral to express the area under the graph of \( r(t) \) between the vertical lines \( t = 0 \) and \( t = 3 \).

(c) What is the practical meaning of integral in part (b)? Be sure to include units in your answer.

(d) Give an expression for the average flow rate between \( t = 0 \) and \( t = 3 \)? Do not estimate—i.e., leave your answer as a formula.